C L A I M S

1. A bistable resistance value acquisition device characterized by comprising at least:

a first metal oxide layer which is made of a metal oxide containing at least two metals, is formed on a substrate, and has a predetermined thickness;

a first electrode which is formed on one surface of said first metal oxide layer; and

a second electrode which is formed on the other surface of said first metal oxide layer.

2. A bistable resistance value acquisition device according to claim 1, characterized by further comprising a third electrode which is formed on said other surface of said first metal oxide layer while being spaced apart from said second electrode.

3. A bistable resistance value acquisition device according to claim 2, characterized by further comprising:

a gate electrode formed from said first electrode;

a source electrode formed from said second electrode; and

a drain electrode formed from said third electrode.

4. A bistable resistance value acquisition device according to claim 1, characterized by further comprising at least:

a second metal oxide layer which is made of the metal oxide, is formed on the substrate, and has a predetermined thickness; and

a fourth electrode which is provided on said second metal oxide layer,

wherein said first electrode, said first metal oxide layer, said second metal oxide layer, and said fourth electrode are connected in series in an order named.

5. A bistable resistance value acquisition device according to claim 1, characterized by further comprising an insulating layer which is formed in contact with at least one of said one surface and said other surface of said first metal oxide layer.

6. A bistable resistance value acquisition device according to claim 4, characterized by further comprising an insulating layer which is formed in contact with at least one of one surface and the other surface of said second metal oxide layer.

7. A bistable resistance value acquisition device according to claim 1, characterized by further comprising at least:

an amorphous layer in an amorphous state which is formed on the substrate;

a plurality of elements each of which includes said first electrode made of a conductive material in a crystalline state and formed on said amorphous layer,

said first metal oxide layer formed on said first electrode, and said second electrode formed on said first metal oxide layer; and

an isolation layer which is made of the metal oxide and formed on said amorphous layer between said elements,

wherein said plurality of elements are isolated by said isolation layer.

8. A bistable resistance value acquisition device according to claim 7, characterized in that said first metal oxide layer and said isolation layer are formed integrally.

9. A bistable resistance value acquisition device according to claim 1, characterized in that a resistance value of the metal oxide changes depending on an electrical signal supplied between said first electrode and said second electrode.

10. A bistable resistance value acquisition device according to claim 9, characterized in that

the metal oxide changes to

a first state having a first resistance value upon application of a voltage having not less than a first voltage value and

a second state having a second resistance value different from the first resistance value upon application of a voltage having not more than a second voltage value with a polarity different from the first

voltage value.

11. A bistable resistance value acquisition device according to claim 9, characterized in that

the metal oxide changes to

a first state having a first resistance value upon application of a voltage more than a first voltage value and

a second state having a second resistance value larger than the first resistance value upon application of a voltage more than a second voltage value in a range not more than the first voltage.

12. A bistable resistance value acquisition device according to claim 1, characterized in that

the metal oxide comprises at least a base layer made of at least a first metal and oxygen, and

a plurality of fine particles made of the first metal, a second metal, and oxygen and dispersed in said base layer.

13. A bistable resistance value acquisition device according to claim 12, characterized in that

said base layer is made of the first metal, the second metal, and oxygen in which a content of the second metal is smaller in comparison with a stoichiometric composition.

14. A bistable resistance value acquisition device according to claim 12, characterized in that

said base layer contains the first metal, the

second metal, and a column crystal of oxygen.

15. A bistable resistance value acquisition device according to claim 12, characterized in that

the metal oxide comprises

a metal oxide monolayer in at least one of a column-crystal state and an amorphous state, which is arranged in contact with said base layer and made of at least the first metal and oxygen.

16. A bistable resistance value acquisition device according to claim 15, characterized in that

in said metal oxide monolayer, a content of the second metal is smaller in comparison with a stoichiometric composition of the first metal, the second metal, and oxygen.

17. A bistable resistance value acquisition device according to claim 15, characterized in that

said metal oxide monolayer does not contain the fine particles.

18. A bistable resistance value acquisition device according to claim 12, characterized in that

the first metal is titanium, the second metal is bismuth, and said base layer is in amorphous state and is formed from a layer containing titanium in an excessive amount relative to a stoichiometric composition.

19. A bistable resistance value acquisition device according to claim 18, characterized in that

said first electrode is made of at least one of ruthenium and platinum and

has at least one of a single-layer structure made of a single material and a layered structure made of a plurality of materials.

20. A bistable resistance value acquisition device according to claim 1, characterized in that the substrate is made of a conductive material.

21. A bistable resistance value acquisition device according to claim 20, characterized in that said first electrode is identical to the substrate.

22. A bistable resistance value acquisition device according to claim 1, characterized in that the metal oxide is a ferroelectric.

23. A method of manufacturing a bistable resistance value acquisition device including at least a first metal oxide layer which is made of a metal oxide containing at least two metals, is formed on a substrate, and has a predetermined thickness, a first electrode which is formed on one surface of the first metal oxide layer, and a second electrode which is formed on the other surface of the first metal oxide layer, characterized by comprising:

the first step of producing a first plasma made of an inert gas and oxygen gas which are supplied at a predetermined composition ratio, applying a negative bias to a target made of at least a first metal

and a second metal and causing particles generated from the first plasma to collide against the target to cause a sputtering phenomenon, and depositing a material of the target, thereby forming the first metal oxide layer made of a metal oxide containing the first metal, the second metal, and oxygen,

wherein the first plasma is an electron cyclotron resonance plasma which is produced by electron cyclotron resonance and receives kinetic energy from a divergent magnetic field, and

the substrate is heated to a predetermined temperature.

24. A bistable resistance value acquisition device manufacturing method according to claim 23, characterized by further comprising the second step of irradiating a surface of a layer made of the metal oxide with a second plasma made of an inert gas and a reactive gas which are supplied at a predetermined composition ratio,

wherein the second plasma is an electron cyclotron resonance plasma which is produced by electron cyclotron resonance and receives kinetic energy from a divergent magnetic field.

25. A bistable resistance value acquisition device manufacturing method according to claim 24, characterized in that the reactive gas is at least one of oxygen gas, nitrogen gas, fluorine gas, and hydrogen

gas.

26. A bistable resistance value acquisition device manufacturing method according to claim 23, characterized in that in the first step, the substrate is heated to a temperature not more than a Curie temperature of the metal oxide.

27. A bistable resistance value acquisition device manufacturing method according to claim 23, characterized in that a voltage to control ion energy generated by the plasma is applied to the substrate.

28. A bistable resistance value acquisition device manufacturing method according to claim 23, characterized in that the first metal is titanium, and the second metal is bismuth.

29. A bistable resistance value acquisition device manufacturing method according to claim 23, characterized in that the target is made of at least the first metal, the second metal, and oxygen.

30. A metal oxide thin film characterized by comprising at least:

a base layer which is made of at least a first metal and oxygen; and

a plurality of microcrystalline grains which are made of the first metal, a second metal, and oxygen and dispersed in said base layer.

31. A method of forming a metal oxide thin film, characterized by comprising:

the step of producing a first plasma made of an inert gas and oxygen gas which are supplied at a predetermined composition ratio, applying a negative bias to a target made of at least a first metal and a second metal and causing particles generated from the first plasma to collide against the target to cause a sputtering phenomenon, and depositing a material of the target on a substrate, thereby forming, on the substrate, a metal oxide thin film including at least a base layer which is made of at least the first metal and oxygen, and a plurality of fine particles which are made of the first metal, a second metal, and oxygen and dispersed in the base layer,

wherein the first plasma is an electron cyclotron resonance plasma which is produced by electron cyclotron resonance and receives kinetic energy from a divergent magnetic field, and

the substrate is heated to a predetermined temperature.

32. A metal oxide thin film forming method according to claim 31, characterized in that the first metal is titanium, and the second metal is bismuth.